

TAXONOMY OF THE *SPOROBOLUS FLORIDANUS* COMPLEX (POACEAE: SPOROBOLINAE)

ALAN S. WEAKLEY

The Nature Conservancy
P.O. Box 2267
Chapel Hill, NC 27515-2267, U.S.A.

PAUL M. PETERSON

Department of Botany
National Museum of Natural History
Smithsonian Institution
Washington, DC 20560-0166, U.S.A.

ABSTRACT

The *Sporobolus floridanus* complex is defined to include five North American species. Keys, descriptions, distributions, illustrations, and habitat information are provided for: *S. curtissii*, *S. floridanus*, *S. silveanus*, *S. teretifolius*, and a new member of the complex from North Carolina, South Carolina, and eastern Georgia, *Sporobolus pinetorum* Weakley and P. M. Peterson. A lectotype is chosen for *S. floridanus*. The taxonomic and ecological relationships of these five species, as well as the related *S. junceus* and *S. heterolepis*, are compared and discussed. *Sporobolus curtissii*, *S. floridanus*, *S. pinetorum*, *S. silveanus*, and *S. teretifolius* are all relatively narrow endemics of various portions of the southeastern Coastal Plain. Each of these five species is the locally dominant or codominant grass in fire-maintained pinelands with open canopies of *Pinus palustris*, *P. serotina*, and/or *P. elliottii* var. *elliottii*. The geographic distributions and many ecological requirements of the *S. curtissii*, *S. floridanus*, *S. pinetorum*, and *S. teretifolius* overlap, but they can be separated on a hydrologic gradient.

RESUMEN

El complejo *Sporobolus floridanus* es definido para incluir cinco especies de Norte America. Se proporcionan claves, descripciones, distribución, ilustraciones, e información del hábitat para: *S. curtissii*, *S. floridanus*, *S. silveanus*, *S. teretifolius*, y un nuevo miembro del complejo de Carolina del Norte, Carolina del Sur y del este de Georgia, *Sporobolus pinetorum* Weakley & P.M. Peterson. Un lectotipo es escogido para *S. floridanus*. Las relaciones taxonómicas y ecológicas de estas cinco especies, así como de las especies afines *S. junceus* y *S. heterolepis*, son comparadas y discutidas. *Sporobolus curtissii*, *S. floridanus*, *S. pinetorum*, *S. silveanus*, y *S. teretifolius* son todas relativamente endémicas restringidas a varias partes del sureste de la llanura costera. Cada una de las cinco especies, es el pasto localmente dominante o codominate en terrenos de pinos mantenidos por quemas con dosel abierto de *Pinus palustris*, *P. serotina*, y/o *P. elliottii* var. *elliottii*. La distribución geográfica y muchos de los requerimientos ecológicos de *S. curtissii*, *S. floridanus*, *S. pinetorum*, y *S. teretifolius* se solapan, pero pueden ser separados en base a un gradiente hidrológico.

Sporobolus R. Br. is a worldwide genus of approximately 160 species occurring in the tropics, subtropics, and warm temperate regions (Clayton &

Renvoize 1986). In the New World the genus is represented by approximately 45 species that generally occur on disturbed habitats, i.e., roadside to open prairies and savannas (Peterson et al. 1995, 1997; Peterson et al., in press). *Sporobolus* is characterized by having spikelets with one floret, 1-veined lemmas, fruits with free pericarps, and ligules with a line of hairs. These characteristics also are found in two other genera, *Calamovilfa* (A. Gray) Hack. and *Crypsis* W.T. Aiton. These three genera seem to share a common ancestor and are the only New World members included in the subtribe Sporobolinae (Chloridoideae: Eragrostideae).

The species of *Sporobolus* occurring in the southeastern United States form a heterogeneous assemblage that may be informally divided into groups based on characteristics of the inflorescence, spikelet, plant longevity, and general aspect. One of these groups, characterized as long-lived, perennial, clump-forming species, with open panicle inflorescences and relatively large spikelets, consists of *S. floridanus* Chapman, *S. curtissii* (Vasey ex Beal) Small ex Scribner, *S. teretifolius* Harper, *S. silveanus* Swallen, *S. pinetorum* Weakley & P.M. Peterson (a new species described here), and, more peripherally, *S. junceus* (P. Beauvois) Kunth and *S. heterolepis* (A. Gray) A. Gray. In the course of conducting conservation, taxonomic, ecological, and herbarium studies in the southeastern United States, it has become apparent that this group is poorly understood and has been much confused by earlier authors, current collectors, and field workers. As a consequence, an overlooked species has remained unnamed. We will try to clarify this situation with a detailed discussion of the five members of what we call the *S. floridanus* complex (*S. floridanus*, *S. curtissii*, *S. teretifolius*, *S. silveanus*, and *S. pinetorum*), with less detailed discussion of *S. junceus* and *S. heterolepis*.

TAXONOMIC HISTORY

Because of the general similarities of the taxa in the *Sporobolus floridanus* complex, there has been widespread confusion about their circumscription and distribution, and much erroneous information can be found in earlier systematic treatments and in the ecological literature, and numerous herbarium specimens are misidentified. A review of previous treatments of the complex and its closest relatives will help define problems resolved in this paper.

The two morphologically peripheral taxa were the first to be named. The species currently known as *S. junceus* was described by Beauvois in 1812 in *Heleochloa*, and transferred to *Sporobolus* by Kunth in 1829. *Sporobolus heterolepis* was first described as *Vilfa heterolepis* by A. Gray in 1835, and transferred by Gray to *Sporobolus* in 1848.

The first of the core members of the *S. floridanus* complex was named by Chapman (1860) as *S. floridanus*. It is fairly well characterized in his description:

"*S. floridanus*, n. sp. Panicle diffuse, large; spikelets (purplish) on long hair-like stalks; glumes acute, the lower one barely shorter than the obtuse paleae, the upper a third longer; leaves rather rigid, flat, pungent, very rough on the edges—Low pine barrens, Middle and West Florida. September.—Culm 2–4 feet high. Leaves 1–2 feet long. Panicle 1–1.5 feet long" (Chapman 1860, 1883, 1897).

The description, the location in Florida, and specimens collected by Chapman at the time make the identity of *S. floridanus* clear. The only species occurring in Florida likely to be confused with *S. floridanus* would be *S. curtissii*, but it is contradicted by various parts of Chapman's description, especially the "panicle ... large," the markedly unequal glumes, the rough-edged leaves, and the length of the blades and the panicle. No type specimen was cited, however, and we lectotypify *S. floridanus* below.

The next to be named was *S. curtissii*, as *S. floridanus* var. *curtissii* (Beal 1896). A year later, Lamson-Scribner elevated the taxon to specific rank (Lamson-Scribner 1897). The distribution of *S. floridanus* was given as "moist pine barrens near the coast, North Carolina to western Florida," apparently on the basis of G. McCarthy's specimen at US (cited below) from Wilmington, North Carolina, which is actually *S. pinetorum*. We know of no specimens of *S. floridanus* from locations north of southern South Carolina.

Harper (1901) made a characteristically idiosyncratic addition to information on the group with his collection of *S. floridanus* in Sumter Co., Georgia, about which he commented "not definitely known outside of Florida before." He elaborated on the roughness of the leaves mentioned by Chapman and stated "I made some tests of their strength. A leaf from the first collection (no. 547) 5.5 mm. wide, not twisted, and perfectly dry, sustained a weight of 27 pounds without breaking."

In 1906, Harper described *S. teretifolius* from collections in Georgia, commenting that it is "a frequent and characteristic inhabitant of moist pine-barrens in the Altamaha Grit region," and that "it is unmistakable when seen in the field" (Harper 1906). He provides excellent and clear character differences between *S. teretifolius*, *S. curtissii*, and *S. floridanus*, as well as an excellent illustration of the highly distinctive leaf cross-section.

The first two editions of J.K. Small's flora (1903, 1913) treated *S. curtissii* and *S. floridanus*, and gave generally accurate information about morphology, habitat, and distribution. *Sporobolus floridanus* was stated as occurring in "Georgia and northern Florida," and *S. curtissii* was found in "Georgia, Florida, and Alabama." Small then added *S. teretifolius* (Small 1933). The habitat of all three species was given as "moist pinelands, Coastal Plain,"

with distributions of "Fla. and Ga" for *S. floridanus*, "Fla. to N.C." for *S. curtissii*, and "Ga." for *S. teretifolius*. The extension of the distribution of *S. curtissii* to North Carolina was apparently based on North Carolina specimens of *S. pinetorum* misidentified as *S. curtissii*. In his key, Small (1933) distinguished the three species as follows:

Leaf-blades narrowly involute	<i>S. teretifolius</i>
Leaf blades flat.	
Pedicels appressed to the branches: leaf-blades about 1 mm wide	<i>S. curtissii</i>
Pedicels spreading: leaf-blades 2-4 mm wide	<i>S. floridanus</i>

Although this key generally serves to distinguish the three species, it has been, in part, responsible for continued taxonomic confusion about the three species and a fourth, *S. pinetorum*. The blades of *S. teretifolius* are anatomically oval, not involute; the blades of *S. curtissii*, *S. floridanus*, and *S. pinetorum* are flat, becoming involute when dry, either during drought conditions in the field, or as a result of drying for herbarium specimens. The narrow blades of *S. curtissii* and *S. pinetorum* usually fold when dried in a plant press. Specimens of *S. curtissii* and *S. pinetorum* often have involute blades that superficially resemble those of *S. teretifolius*. A second problem with the key involves the width of the blade; both *S. curtissii* and *S. pinetorum* have blades regularly reaching and sometimes exceeding 2 mm in width (when flat), and *S. floridanus* characteristically has a leaf blade 3-10 mm wide (though the very narrowest blade on a plant may be as narrow as 2 mm wide). Therefore, specimens of *S. curtissii* and the heretofore unnamed *S. pinetorum* have often been incorrectly identified as *S. teretifolius* (by taking the first lead) or *S. floridanus* (by correctly taking the second lead in the first couplet, but then incorrectly choosing the second lead in the second couplet by placing too much emphasis on a blade width of ca. 2 mm).

Hitchcock (1935) treated *S. floridanus* ("low pine barrens, Georgia and Florida"), *S. curtissii* ("dry pine barrens, North Carolina, Georgia, and Florida"), and *S. teretifolius* ("moist pine barrens, Georgia"). Once again, the inclusion of North Carolina in the distribution of *S. curtissii* was apparently based on miss identification of specimens of *S. pinetorum*.

Blomquist's (1948) book on the grasses of North Carolina treated all material of this complex in North Carolina as *S. curtissii*, but states "According to Swallen (1941) the North Carolina plants assigned to this species may belong to *S. floridanus* Chapm." As will be seen below, neither species has been documented for North Carolina; instead, North Carolina is within the distribution of *S. pinetorum* (undescribed at the time and in some ways generally intermediate in characteristics) and *S. teretifolius* (not collected in North Carolina until 1991).

Swallen (1941) added *S. silveanus* to the group, based on material from eastern Texas. Its distribution in Texas and the western Gulf Coastal Plain

of Louisiana makes it allopatric relative to other members of the *S. floridanus* complex. Swallen contrasted it with *S. floridanus* and *S. teretifolius*, yet various characters (such as the appressed and larger spikelets) suggest a closer relationship to *S. curtissii*. It also seems to show a clearer connection to *S. heterolepis* than do other members of the *S. floridanus* complex, a relationship which seems especially plausible given its proximity to *S. heterolepis* and its habitat preferences for barrens with prairie affinities.

Hitchcock and Chase (1950) provided the only treatment to date with as many as four of the species in the complex: *S. floridanus* ("low pine barrens, North Carolina to Florida"), *S. curtissii* ("dry pine barrens, North Carolina to Florida"), *S. teretifolius* ("moist pine barrens, North Carolina and Georgia"), and *S. silveanus* ("open woods, western Louisiana and eastern Texas"). The attribution of *S. floridanus*, *S. curtissii*, and *S. teretifolius* to North Carolina are all based on misidentifications of *S. pinetorum*. This is because of the generally intermediate morphology of *S. pinetorum*, and because the key was not constructed very carefully for even the then-known members of the group. Among the problems are that *S. silveanus* (which has markedly appressed spikelets) can only be reached by following the lead for "spikelets not appressed, the branches and pedicels somewhat spreading"; *S. floridanus* is separated from *S. silveanus* by having glumes "about equal" rather than "unequal," when they actually have similarly subequal first glume to second glume ratios; *S. teretifolius* is separated from *S. floridanus* by the accurate but often mis-interpreted "blades terete vs. blades flat or folded" character; and *S. curtissii* is separated from the others by a subjective and difficult to interpret couplet about pedicel length and orientation.

Radford et al. (1964), by contrast, recognized only one species (*S. teretifolius*) in the complex as occurring in North Carolina and South Carolina. Unfortunately, all material seen by them was actually the undescribed *S. pinetorum*. Radford et al. (1968) added *S. floridanus* (alleged to occur in pinelands in Lancaster County, South Carolina) and attributed *S. teretifolius* to "savannahs" in thirteen counties in southern North Carolina and northern South Carolina. Their key distinguished *S. teretifolius* from *S. floridanus* by "blades terete or subterete" vs. "blades flat or folded." All material seen by them was actually *S. pinetorum*, often with narrow folded blades so as to superficially mimic *S. teretifolius*. Additionally, many of the county records are based on misidentified specimens of *Calamovilfa brevipilis* (Torrey) Scribner, and likewise specimens supposedly documenting county record distributions for *Calamovilfa brevipilis* are in many cases actually *Sporobolus pinetorum*. In truth, both *Sporobolus pinetorum* and *Calamovilfa brevipilis* occur (or formerly occurred) in most or all counties in southeastern North Carolina and in the adjacent counties of South Carolina.

Godfrey and Wooten's (1979) manual of southeastern United States wetland plants treated only *S. floridanus* and *S. curtissii*, inexplicably omitting *S. teretifolius*

(which occupies wetter habitats than *S. curtissii*) and *S. silveanus* (which occurs in wetland situations in Louisiana, part of the geographic range of their flora). Because of this, their treatment is of limited value in understanding this group.

Brown (1993) addressed confusion between *S. silveanus*, the most western species in the complex, and *S. heterolepis*, resulting in the deletion of *S. heterolepis* from the floras of Texas and Louisiana, and the addition of *S. silveanus* to the flora of Oklahoma.

SYSTEMATIC TREATMENT

KEY TO THE SPECIES

1. Panicle branches distinctly whorled at lower nodes *S. junceus*
1. Panicle branches single at lower nodes (though a few branches may be irregularly approximate in pairs or threes) 2
 2. First glume scaberulous, subulate above an expanded base; spikelets gray to nearly black; base of plant relatively fibrous; grain spherical; plants of rocky barrens and prairies of physiographic provinces inland from the Coastal Plain *S. heterolepis*
 2. First glume glabrous, linear-lanceolate to lanceolate, the base not abruptly expanded; spikelets purplish (fading tan); base of plant smooth and hard, made up of the indurated leaf bases; grain oblong (when present, usually abortive); plants primarily of pine savannas and seeps of the Coastal Plain of North Carolina, South Carolina, Georgia, Florida, Alabama, Louisiana, and Texas, but extending further inland in southern Oklahoma and eastern Texas 3
 3. Blades terete or subterete (wiry), 0.5–1.2 mm wide, oval in cross-section (deeper than wide), sometimes irregularly channeled for portions of their lengths (but lacking any flat portion), margins smooth, distal portions often curling and twisted; pedicels with scattered ascending hairs 5. *S. teretifolius*
 3. Blades flat, 0.8–10 mm wide, flat or V-shaped in cross-section (much wider than deep), with free margins their entire length, margins scaberulous (glabrous to scaberulous in *S. curtissii*), distal portions normally stiff and straight (note that the blades of the narrower-leaved species can appear superficially wiry); pedicels without scattered ascending hairs, either glabrous to scaberulous or scabrous 4
 4. Lower glume usually as long or longer than the upper glume with lower/upper ratio averaging 0.90–1.15; culms 30–80(–90) cm tall; panicle 10–25 cm long; pedicels 0.5–4(–8) mm long, appressed, usually shorter than the spikelet; leaves less than 30 cm long, smooth on the margins 1. *S. curtissii*
 4. Lower glume usually shorter than the upper glume with a lower/upper ratio averaging 0.60–0.90; culms (30–)45–200(–250) cm tall; panicle 15–50 cm long; pedicels 2–22 mm long, spreading or appressed; leaves mostly more than 30 cm long, scaberulous on the margins 5
 5. Pedicels appressed; lemmas 4.4–6.5 mm long, purple; anthers 3.5–5 mm long; blades 1–2.5 mm wide and bluish-green; plants known west of the Mississippi River 4. *S. silveanus*

5. Pedicels spreading; lemmas 3–4.3 mm long, purplish-brown; anthers 2–3.4 mm long; blades either wider than 2.5 mm, or dark green; plants from east of the Mississippi River 6
6. Blades (2–)3–10 mm wide, bluish-green; panicles (18–)30–50 cm long, 4–15 cm wide; lower/upper glume length ratio averaging 0.75–0.90; plants from southern South Carolina, Georgia, eastern Alabama, and northwestern Florida 2. *S. floridanus*
6. Blades 1.2–2(–3) mm wide, dark green; panicles 15–30 cm long, 2–6 cm wide; lower/upper glume length ratio averaging 0.60–0.80; plants from eastern North Carolina, northern South Carolina, and eastern Georgia 3. *S. pinetorum*

1. *Sporobolus curtissii* (Vasey ex Beal) Small ex Scribn., U.S.D.A. Div. Agrostol. Bull. 7:142. 1897. (Figs. 1, j; 2). *Sporobolus floridanus* var. *curtissii* Vasey ex Beal, Grass. N. Amer. 2:290. 1896. TYPE: U.S.A. FLORIDA: 1883, *Curtiss s.n.* (HOLOTYPE: MSC; ISOTYPE: US-556876!).

Caespitose perennials. Culms 30–80(–90) cm tall, erect, nodes all basal; base diameter 1–2 mm, flattened; internodes glabrous. Sheaths glabrous to appressed hairy, hairs up to 4 mm long; base shiny and enduring; margins hyaline; summit with a tuft of hairs, hairs up to 4 mm long. Ligules 0.2–0.6 mm long, a line of hairs. Blades 5–22(–28) cm long, 0.8–2(–2.2) mm wide, flat to folded or involute, green, remaining green well into winter, mostly glabrous above and below; base densely pilose on upper surface, white to grayish hairs up to 4 mm long; margins glabrous to scaberulous. Panicles 10–25 cm long, 2–10(–13) cm wide, mostly open, contracted when immature, pyramidal to ovate; main axis glabrous to scaberulous; pulvini in axils of primary branches glabrous or occasionally hairy; primary branches 2–9(–10) cm long, ascending to spreading 10–80° from culm axis, not floriferous on lower 1/3; secondary branches mostly appressed; pedicels 0.5–4(–8) mm long, usually shorter than spikelet, appressed, glabrous. Spikelets 3.5–6(–6.6) mm long, purplish-brown. Glumes (2.9–)3.5–6(–6.6) mm long, linear-lanceolate, membranous, 1-veined, equal to subequal; ratio of lower/upper glume length 0.90–1.15(–1.33); lower (2.9–)3.5–6.2 mm long, apex acuminate; upper 3.2–6.6 mm long, apex acuminate. Lemmas 3.4–4.5 mm long, ovate to lanceolate, membranous, 1-veined, glabrous; apex acute. Paleas 3.4–4.5 mm long, ovate, membranous, glabrous; apex acute. Stamens 3, anthers 1.5–2.8 mm long, yellow to purplish. Grains 1.1–1.4 mm long, fusiform, reddish-brown.

Common name.—Curtiss' dropseed.

Distribution and habitat.—Eastern South Carolina south to central peninsular Florida, west to Florida Panhandle. Mesic to dry-mesic pine woodlands, in soils seasonally saturated at the surface or rather well-drained throughout the year, usually under *Pinus palustris*, and sometimes also with *Quercus spp.*; 0–100 m. *Sporobolus curtissii* characteristically occurs in the following Na-

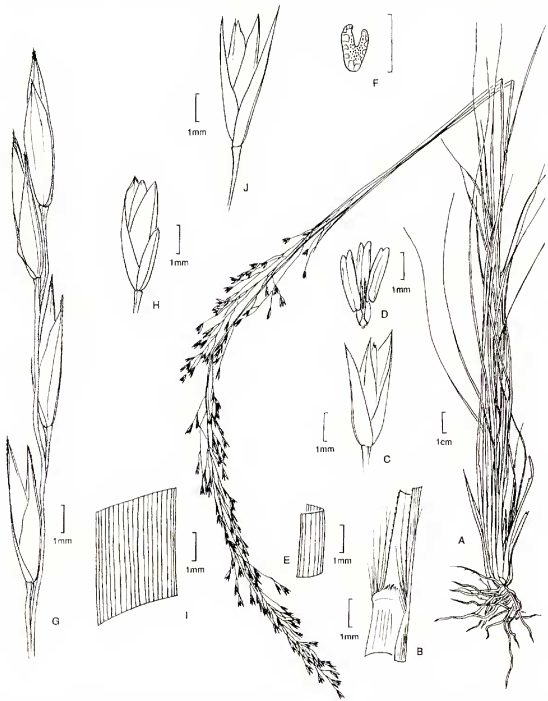


FIG. 1. A–E. *Sporobolus pinetorum* (based on Weakley s.n., 31 Aug 1993). A. Habit. B. Ligule. C. Spikelet. D. Pistil and stamens. E. Blade, lateral view. F. *Sporobolus teretifolius* (Weakley & Schafale s.n., 16 Jul 1991). F. Blade, transverse section. G. *Sporobolus silveanus* (Waller & Bauml 3128). G. Four spikelets on a branch of the inflorescence. H, I. *Sporobolus floridanus* (Curtiss 4054). H. Spikelet. I. Blade, abaxial view. J. *Sporobolus curtissii* (Duncan 7855). J. Spikelet.

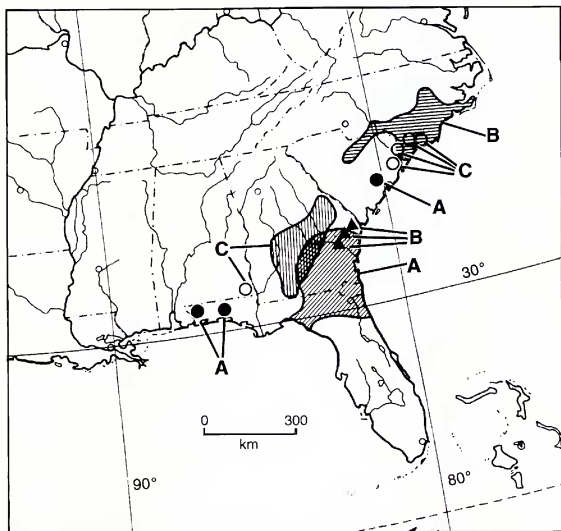


FIG. 2. Geographic distribution of *Sporobolus curtissii* (A), *Sporobolus pinetorum* (B), and *Sporobolus teretifolius* (C).

tional Vegetation Classification plant associations: *Pinus palustris*/*Serenoa repens*-*Vaccinium myrsinites*/*Aristida beyrichiana*-*Sporobolus curtissii* Woodland; *Pinus palustris*/*Quercus incana*-*Quercus stellata*/*Aristida beyrichiana*-*Sporobolus junceus*-*Nolina georgiana* Woodland; *Pinus palustris*-(*Pinus elliottii* var. *elliottii*)/*Sporobolus pinetorum*-*Aster reticulatus*-(*Sporobolus curtissii*) Woodland (Weakley et al. 1998). Flowering July to November (or less typically at other seasons if stimulated by fire).

Comments.—When fertile, *S. curtissii* is readily distinguished by the short-pedicelled, appressed spikelets, and by the large lower glume. Vegetatively, *S. curtissii* is distinctive in its short leaf blades and tendency to have glabrous leaf margins. Post-fire foliage tends to be narrow, stiff, and erect, while unburned plants produce leaves that are shorter, wider, and laxer. It occupies drier habitats than *S. floridanus*, *S. teretifolius*, and *S. pinetorum*, though it can be found in mixed populations with all three species.

Representative specimens. **FLORIDA.** Alachua Co.: Gainesville, *Combs s.n.* (GH). Baker Co.: Olustee Experimental Forest, Olustee, 9 Jun 1936, *Watkins 1* (US). Bradford Co.: (FLAS). Clay Co.: 7 mi NW of Middleburg, abundant on peaty pond pine savanna, 28 Jul 1967, *McDaniel 9541* (BRIT/VDB, GA). Columbia Co.: Lake City, 11–19 Jul 1895, *Nash 2213* (GA, GH, NCU, US). Duval Co.: moist pine barrens near Jacksonville, 6 Aug & 13 Nov 1894, *Curtis 5181* (GA, GH, US). Manatee Co.: 1996, *McMillan 1534* (NCU). Okaloosa Co.: (reported in Clewell 1985). Orange Co.: Grasmere, 23 Sep 1898, *Combs & Baker 1127* (US). Polk Co.: 1996, *McMillan 1534*, (NCU). Putnam Co.: E of Palatka, open field, 26 Oct 1940, *Silvens 6737* (US). St. Lucie Co.: dry pine barrens, Fort Pierce, 25 June 1939, *Silvens 4429* (DUKE). Taylor Co.: wet pine flatwoods, 1979, *Golfrey 77245* (GA). **GEORGIA.** Berrien Co.: Alapa Experimental Range, 2 mi S of Alapa, dominant (reported by Lemon 1949); Brantley Co.: moist open pinelands 1.5 mi W of Nahunta, 1953, *Duncan 17036* (GH). Bryan Co.: Fort Stewart, 1996, *McMillan 1061, 1064, 1065* (NCU). Charlton Co.: Camp Cornelia, 1902, *Ricker 932* (GH, US). Clinch Co.: pine barrens, Okifionokee [sic] pocket, 8 Oct 1938, *Eyles 396* (DUKE). Coffee Co.: 5 mi south of Ocmulgee River, 18 May 1954, *Cooley 2780* (US). Cook Co.: 2.7 mi NE of Barney on Ga. 76, 7 Nov 1993, *Sorrie 7786* (NCU). Dougherty Co.: dry sand, fossil dunes, East Albany, 30 Aug 1947, Thorne 6441 (GA). Echols Co.: longleaf pine–palmetto flatwoods near Ga. 94, 17 Aug 1967, Clewell 2624 (FSU). Glynn Co.: 1996, *McMillan 1082, 1082a* (NCU). Liberty Co.: Fort Stewart, 1996, *McMillan 1068, 1074, 1075* (NCU). Long Co.: 1996, *McMillan 1048, 1048a* (NCU). Lowndes Co.: S of Melrose, 4 Sep 1902, *Harper 1603* (GH, US). Tattnall Co.: 1996, *McMillan 1081* (NCU). Toombs Co.: 13 Dec 1993, *Sorrie & Weakley 7801* (GA). Wayne Co.: 1 mile S of Jesup, 1947, *Duncan 7855* (GA, GH, FLAS, US). **SOUTH CAROLINA.** Berkeley Co.: Francis Marion National Forest, 21 Jul 1994, *Sorrie 8075* (NCU); locally dominant, growing in dense and obviously quite old tussocks in gummy longleaf/loblolly flatwoods W of Tiger Corner, 30 May 1995, *McMillan & Kjellmark 1015* (NCU, USCH), 24 Jul 1996, *McMillan 1748* (CLEMS, NCU, USCH).

2. *Sporobolus floridanus* Chapm., Fl. South. U.S. 550. 1860. (Figs. 1, h, i; 3). TYPE: U.S.A. FLORIDA. Franklin Co.: Apalachicola, *Chapman s.n.* (LECTOTYPE, here designated: NY, bar code, 001274741; ISOLECTOTYPE: US-9982631).

Robust caespitose perennials. Culms (40–)100–200(–250) cm tall, erect, nodes all basal; base diameter 1.5–6 mm, flattened; internodes glabrous. Sheaths glabrous to appressed hairy, hairs up to 5 mm long; base shiny and enduring; margins hyaline; summit with a tuft of hairs, hairs up to 6 mm long. Ligules 0.2–0.7 mm long, a line of hairs. Blades (10–)25–50 cm long, (2–)3–10 mm wide, flat to folded, pale bluish-green and yellowing in age, mostly glabrous above and below; base often sparsely hairy, hairs up to 6 mm long; margins scaberulous. Panicles (18–)30–50 cm long, 4–15 cm wide, mostly open, contracted when immature, pyramidal to ovate; main axis scabrous; pulvini in axils of primary branches hairy or glabrous; primary branches 4–15 cm long, ascending to spreading 10–90° from culm axis, not floriferous on lower 1/3; secondary branches ascending to spreading; pedicels 2–14 mm long, usually longer than spikelet, spreading, scaberulous. Spikelets (3.7) 4–6 mm long, purplish-brown. Glumes (2.5–)2.8–5.7 mm long, linear-lanceolate, membranous, 1-veined, subequal; ratio of lower/upper glume length (0.60–)0.75–0.90(–0.94); lower 2.5–5.1 mm long, apex acuminate;

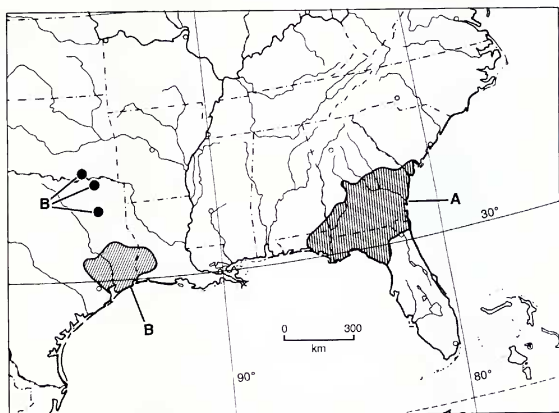


FIG. 3. Geographic distribution of *Sporobolus floridanus* (A) and *Sporobolus silveanus* (B).

upper 3.7–5.7 mm long, apex acuminate to acute. Lemmas 3–4 mm long, ovate to lanceolate, membranous, 1-veined, glabrous; apex acute. Paleas 3–4 mm long, ovate, membranous, glabrous; apex obtuse to truncate, rarely minutely bifid. Stamens 3, anthers 2–3.1 mm long, purplish. Grains 1.7–2 mm long, fusiform, reddish-brown.

Common name.—Florida dropseed.

Distribution and habitat.—Southeastern South Carolina south to northern peninsular Florida, west to Florida Panhandle. Wet to wet-mesic pine woodlands, in soils semi-permanently to seasonally saturated at the surface, and even in places where water may pond for weeks, usually under *Pinus elliotii* var. *elliottii*, *Pinus palustris*, or *Taxodium ascendens* Brongn., and also in seepage bogs, treeless swales, and depressional wetlands in pineland landscapes; 0–100 m. *Sporobolus floridanus* characteristically occurs in the following National Vegetation Classification plant associations: *Pinus palustris*–*Pinus elliotii* var. *elliottii*/Ctenium aromaticum–*Aristida beyrichiana*–*Sporobolus floridanus* Woodland; *Pinus palustris*–*Pinus elliotii* var. *elliottii*/Syrax americanus var. *pulverulentus*/ *Sporobolus floridanus* Woodland (Weakley et al. 1998). Flowering July to November (or less typically at other seasons if stimulated by fire).

Comments.—This is a common and conspicuous grass within its range,

and is often a dominant to codominant component of wet pinelands. The wide leaves with distinctly bluish cast are distinctive in this species.

Representative specimens. ALABAMA. Houston Co.: (Gunn, pers. comm). FLORIDA: Dixie Co.: flatwoods near Hines, 26 Aug 1937, *West et al.* 88-174 (FLAS, US). Duval Co.: moist pine barrens, near Jacksonville, Oct 1894, *Curtiss* 3378 (GA, GH, NCU). Franklin Co.: pine-turkey oak woodland [likely a wetland inclusion in or near this habitat], 1 mile from bridge over Ochlochonee Bay, 14 Jul 1954, *Ford* 3124 (US). Gulf Co.: St. Joe, open pineland, 5 Oct 1940, *Silveus* 6498 (US). Levy Co.: Ellzen [or Ellzey], flatwoods, infrequent, 3 Sep 1898, *Combs* 818 (US). Liberty Co.: *Anderson* 12303 (FSU). Madison Co.: 1955, *Godfrey* 54004 (DUKE, FSU, GH). Wakulla Co.: St. Marks Refuge, *Sorrie* 7785 (NCU). Walton Co.: de Funiak Springs, 1898, *Combs* 446 (GH). GEORGIA. Baker Co.: Jones Ecological Research Station, Ichauway Plantation, Jack Baker Woods, 17 Aug 1995, *McMillan, Kjellmark, & Drew* 1110 (USCH). Berrien Co.: Forest Experiment Station, 5 mi NE of Tifton, open pine woods, moist sandy soil, 1943, *Biswell & Lemon* PL-270 (FLAS, and reported in Lemon 1949). Brooks Co.: wet seepage area in upland pine woods, 1.4 mi N of Morven, 6 Sep 1967, *Faircloth & Faircloth* 4829 (GA, NCU). Bulloch Co.: , 20 April 1994, *Sorrie* 7859 (GA, NCU). Cook Co.: 4 mi SE of Adel, open pine forest, 27 Jun 1957, *Pohl* 7636 (GH). Dooley Co.: open partially drained cypress pond, on W side of railroad, 2.7 mi SSE of Unadilla, 31 Jul 1953, *Harper, Humphrey, & Duncan* 16839 (GA). Echols Co.: open pine-palmetto flatwoods on the E side of the Alapaha River, 3.6 mi S of Mayday, 21 Oct 1967, *Faircloth* 4978 (GA, NCU). Lanier Co.: open pine woodland alongside US 221, 2.5 mi WSW of Lakeland, 12 Oct 1967, *Faircloth* 4950 (GA, NCU). Long Co.: disturbed pocosin, 6.3 mi W of 301 on Ga. 261, 6 Oct 1962, *Bozeman & Radford* 1964 (NCU). Lowndes Co.: open longleaf pine forest on level terrain 5 mi E of Valdosta, 12 Oct 1963, *Duncan* 22210 (GA). Sumter Co.: moist pine barrens, 31 Aug 1900, *Harper* 547 (GH). Tattnall Co.: common in slash pine flatwoods clearing, ca. 2 mi S of Glenville, 11 Sep 1972, *Godfrey* 72107 (FSU, NCU). SOUTH CAROLINA. Jasper Co.: dominant on mesic to wet *Pinus elliotii*/*P. palustris* savanna on Rains series sandy loam with Paxville fine loamy inclusions, 28 Jun 1995, *McMillan & Kjellmark* 1035 (CLEMS, NCU, USCH).

3. *Sporobolus pinetorum* Weakley & P.M. Peterson, sp. nov. (Figs. 1, a-e; 2). TYPE: U.S.A. NORTH CAROLINA. Cumberland Co.: Fort Bragg Army Base, Macridge Danger Zone, ecotonal seepages and moist swales in upland *Pinus palustris* savannas *Weakley s.n.*, 31 Aug 1993 (HOLOTYPE: US!; ISOTYPE: NCU!).

A. S. floridani laminae foliorum 1.2-2(-3) mm latis atrovirentibus, inflorescentis 15-30 cm latis, culmis 45-120 cm altis, racione longitudinis glumarum inferiorum/superiorum 0.60-0.80, recedit.

Caespitose perennials. Culms (30-)45-120(-180) cm tall, erect, nodes all basal; base diameter 1-3 mm, flattened; internodes glabrous. Sheaths glabrous to appressed hairy, hairs up to 4 mm long; base shiny and endurated; margins hyaline; summit with a tuft of hairs, hairs up to 4 mm long. Ligules 0.2-0.6 mm long, a line of hairs. Blades 20-50 cm long, 1.2-2(-3) mm wide, flat to folded or involute, dark green, remaining green well into winter, mostly glabrous above and below; base often sparsely hairy, hairs up to 4 mm long; margins scaberulous. Panicles 15-30 cm long, 2-6 cm wide, mostly open, contracted when immature, pyramidal to ovate; main axis

scaberulous; pulvini in axils of primary branches hairy or glabrous; primary branches 2–8 cm long, ascending to spreading 0–50° from culm axis, not floriferous on lower 1/3; secondary branches ascending to spreading; pedicels 2–22 mm long, usually longer than the spikelet, spreading, scaberulous. Spikelets 3.5–6.5 mm long, purplish-brown. Glumes 2.4–6.5 mm long, linear-lanceolate, membranous, 1-veined, subequal to unequal; ratio of lower/upper glume length (0.58–)0.60–0.80(–0.83); lower 2.4–4.5 mm long, apex acuminate; upper (3.5–)4–6(–6.5) mm long, apex acuminate to acute. Lemmas 3.4–4.3 mm long, ovate to lanceolate, membranous, 1-veined, glabrous; apex acute. Paleas 3.4–4.4 mm long, ovate, membranous, glabrous; apex obtuse to truncate, often bifid with teeth up to 0.4 mm long. Stamens 3, anthers 2.5–3.4 mm long, purplish. Grains 1.8–2.2 mm long, fusiform, brown.

Common name.—Carolina dropseed.

Distribution and habitat.—Eastern North Carolina south to northern South Carolina; and disjunct in eastern Georgia. Wet to moist pine woodlands, in soils seasonally to semi-permanently saturated, usually under *Pinus palustris* and *Pinus serotina*, also sometimes associated with *Taxodium ascendens* and (in Georgia) *Pinus elliotii* var. *elliottii*. *Sporobolus pinetorum* characteristically occurs in the following National Vegetation Classification plant associations: *Pinus palustris*–(*Pinus elliotii* var. *elliottii*)/*Sporobolus pinetorum*–*Aster reticulatus*–*Sporobolus curtissii* Woodland; *Pinus palustris*–*Pinus elliotii* var. *elliottii*/*Styrax americanus* var. *pulverulentus*/*Sporobolus floridanus* Woodland; *Pinus palustris*–*Pinus serotina*/*Sporobolus pinetorum*–*Aristida stricta*–*Eryngium integrifolium* Woodland; *Pinus palustris*–*Pinus serotina*/*Sporobolus pinetorum*–*Ctenium aromaticum*–*Eriocaulon decangulare* var. *decangulare* Woodland; *Pinus elliotii* var. *elliottii*–*Taxodium ascendens*/*Hypericum brachyphyllum* / *Sporobolus pinetorum*–*Dichanthelium scabriusculum* Woodland (Weakley et al. 1998). July to November (or less typically at other seasons if stimulated by fire).

Comments.—This species has been overlooked until now because its overall morphology places it centrally in the complex, allowing it to be variously confounded with *S. floridanus*, *S. curtissii*, and *S. teretifolius*. Despite its “intermediate gestalt,” it has a unique combination of characters that warrant taxonomic recognition. Moreover, it occurs in mixed populations with *S. floridanus* (in eastern Georgia), *S. curtissii* (in eastern Georgia), and *S. teretifolius* (in southeastern North Carolina), and in these situations the taxa are easily distinguishable and show no signs of intermediacy or hybridization. *Sporobolus pinetorum* is locally abundant in seasonally saturated pinelands within its range; because it does not typically flower except following fire, casual field observers have often overlooked its presence and misidentified it as *Aristida stricta*.

Specimens examined. **GEORGIA.** Chatham Co.: pineland, Ogeechee Canal, 4 Aug 1939, Eyles 6447 (US). **Liberty Co.:** in ecotone of *Pinus palustris*/*Aristida beyrichiana* flatwoods and *Taxodium ascendens* drain, 1995, McMillan 1967 (NCU); codominant with *Sporobolus curtissii* in mesic longleaf pine/saw palmetto flatwoods on Fort Stewart Military Reservation sec. A-5, 4 Sep 1995, McMillan, Kjellmark, & Thompson 1171 (USCH); **Long Co.:** infrequent to rare on mesic longleaf pine savanna and pond cypress depression ecotone on Leesfield series soil transition, Fort Stewart Military Reservation on RSPAC in sect. D-12, 4 Sep 1995, McMillan, Kjellmark, & Thompson 1170 (USCH). **NORTH CAROLINA.** Bladen Co.: dry savanna 10 mi N of White Lake, 8 Oct 1944, Blomquist 13617 (DUKE); flat pine woods, 6.4 mi ESE of Ammon on road to Garland, 19 Oct 1957, Ables 37439 (NCU). **Brunswick Co.:** low burned savanna on W side of road to Ft. Caswell, near junction of Sawdust Trail, 1938, Blomquist 10448 (GH, US); burnt longleaf pine–live oak area near inland waterway bridge, Long Beach road, 29 Oct 1950, Boyce & Godfrey 1602 (NCSC); Southport–Supply, savanna, 23 Aug 1930, Blomquist 97 (DUKE, PH); Southport–Supply, savanna, 31 Aug 1931, Blomquist 6672 (DUKE, US); Pireway, savanna, 4 Aug 1933, Schallert s.n. (US); shrubby area in pine barrens, Boiling Springs Lakes subdivision, about 2 mi N of jct. of NC 87 & 133, off rte. 133 (N of Southport), 24 Oct 1962, Terrell & Smith 3697 (NCU); plowed fire lane through a bog, Orton, 28 Sep 1941, Godfrey 10053 (NCU). **Columbus Co.:** cut over pine savanna to E of Co. road, 2.6 mi straight NW of Nakissa [sic; probably Nakina], 17 Oct 1958, Bell 15739 (NCU); Schulkens Savanna, 1.7 mi W of Old Dock, 17 Jul 1991, Weakley, Schafale, & LeBlond s.n. (NCU, US). **Cumberland Co.:** Fort Bragg Army Base, Macridge Danger Zone, ecotonal seepages and moist swales in upland *Pinus palustris* savannas, 31 Aug 1993, Weakley s.n. (US, NCU). **Duplin Co.:** transition near Kenansville, 14 May 1925, n. c. (NCSC); burned savanna between Clinton and Seven Springs, 7 Jul 1946, Blomquist 13936 (DUKE); field woodland border, 0.3 mile NW of Pin Hook, 2 Aug 1957, Ables & Leisner 33175 (NCU). **Greene Co.:** savanna 1.1 mi SE of Jason, 1958, Radford 40402 (FLAS). **Harnett Co.:** 16 Nov 1992, Sorrie 7116 (NCU). **Hoke Co.:** 7 Oct 1991, Sorrie 5945 (NCU); 9 Oct 1991, Sorrie 5959 (NCU); 25 Nov 1991, Sorrie 6101 (NCU); 28 Sep 1992, Sorrie 7007 (NCU). **Jones Co.:** savanna, 1.2 mi SSW of Pleasant Hill, 9 Sep 1958, Radford 39935 (NCU); savanna, 3 mi SE of Pink Hill, 9 Sep 1958, Radford 39838 (NCU); savanna, 4.3 mi WNW of Hargetts Store, 18 Jul 1958, Radford 36898, (GA, GH, NCU). **Lenoir Co.:** pine forest, near NC 11, 1 mile N of Pink Hill, 24 Oct 1957, Radford 31655 (NCU). **New Hanover Co.:** Wilmington, 1885, McCarthy s.n. (US). **Onslow Co.:** Folkstone, 3 Aug 1939, Silveus 4856 (US); savanna, 9.6 mi N of Hollyridge, 27 Jul 1957, Ables & Leisner 32690 (NCU); Camp Lejeune, 23 Sep 1990, Sorrie, Weakley, LeBlond 5282 (GH); , 5 Sep 1991, Churchill 91-170 (BRIT/VDB); cut-over savanna about 10 mi NW of Holly Ridge toward Maple Hill, common, 16 Aug 1967, Wilbur 9432 (DUKE); W side of US 17, 0.6 mi S of fire tower, Jun 1991, Weakley & Peet s.n. (US). **Pender Co.:** 30 Aug. 1991, Sorrie & LeBlond 5889 (GH, NCU). **Richmond Co.:** seep in powerline west of NC 177, 12 Sep 1993, Sorrie 7679 (NCU); Sandhills Game Land, 28 Oct 1997, Sorrie 9621 (GA, GH, NCU, US). **Robeson Co.:** woodland border, 2 mi N of Allenton, 21 Jun 1957, Ables & Haesloop 29011 (NCU). **Sampson Co.:** pine savanna, 1.3 mi SE of junction US 421 and 701 on US 421 (SSE of Clinton), 8 Aug 1957, Ables & Leisner 33702 (NCU). **Scotland Co.:** 8.3 mi SSE of Hoffman, 11 Oct 1959, McNeely 916 (NCU); 4 Sep 1994, Sorrie 8187 (NCU). [no Co.]: in Oriente Carolina Septentrionalis, locus paludosis [in eastern North Carolina, boggy places], Aug 1885, McCarthy s.n. (NCU, PH, US). **SOUTH CAROLINA.** Berkeley Co.: Jun 1998, Peet & McMillan 6841 (NCU). Chesterfield Co.: cleared, burned-over shrub bog in the Sandhills 1 mile W of McBee, 7 Sep 1939, Godfrey 8052 (DUKE, GH, NCSC, PH, US); savanna, Montrose near US 52, 29 Sep 1956, Radford 18667 (NCU);

sandhill, 1.3 mi SW of Patrick near US 1, 29 Sep 1956, *Radford 18761* (NCU); Sandhills National Wildlife Refuge, 16 Apr 1992, *Sorrie et al. 6246* (USCH); Sandhills National Wildlife Refuge, 1995, *Pittman s.n.* (US); Hudsonia Flat, 6 Oct 1993, *Sorrie 7746* (NCU).

4. *Sporobolus silveanus* Swallen, J. Wash. Acad. Sci. 31:350. 1941. (Figs. 1, g; 3). TYPE: U.S.A. TEXAS. Orange Co.: 10 mi NE of Orange on U.S. 90, 30 Sep 1940, *Silveus 6441* (HOLOTYPE: US-1817963!; ISOTYPES: US-1867557!, US-2209343!).

Densely caespitose perennials. Culms 70–120 cm tall, erect, nodes sometimes visible, mostly basal; base diameter 1.5–4.5 mm, rounded or flattened; internodes glabrous. Sheaths mostly glabrous to appressed hairy, hairs up to 4 mm long; base shiny and endurated; margins hyaline; summit with a tuft of hairs, hairs up to 4 mm long. Ligules 0.2–0.8 mm long, a line of hairs. Blades 15–52 cm long, 1–2.5 mm wide, flat to folded or involute, bluish-green, glabrous above and below; margins scaberulous. Panicles 21–50 cm long, 5–12(–15) cm wide, open and few flowered; pyramidal to ovate; main axis scabrous; pulvini in the axils of primary branches glabrous; primary branches 6–20 cm long, ascending and loosely spreading 20–50° from culm axis, not floriferous on lower 1/4–1/2; secondary branches appressed to loosely spreading; pedicels 3–8(–14) mm long, longer or shorter than spikelet, mostly appressed, scabrous. Spikelets 4.5–7(–7.2) mm long, purplish. Glumes 3–7 mm long, linear-lanceolate to lanceolate, membranous, 1-veined, subequal to unequal, ratio of lower/upper glume length 0.6–0.9; lower 3–4.6 mm long, apex acuminate; upper 4–7.2 mm long, often appearing 3-veined with lateral folds that resemble veins; apex acuminate. Lemmas 4.4–6.5 mm long, lanceolate, membranous, 1-veined, glabrous; margins often hyaline; apex acuminate to acute. Paleas 4.5–6.7 mm long, lanceolate, membranous, glabrous; apex obtuse to truncate, minutely erose. Stamens 3, anthers 3.5–5 mm long, purplish. Grains 1.8–2.5 mm long, obovoid, laterally compressed, light brownish.

Common name.—Silveus dropseed.

Distribution and habitat.—Western Louisiana west to eastern Texas and north to southeastern Oklahoma. Wet to mesic pine woodlands under *Pinus palustris*, also in adjoining glade and barren openings, and in blackland prairies, 5–200 m. *Sporobolus silveanus* characteristically occurs in the following National Vegetation Classification plant associations: *Pinus palustris/Sporobolus silveanus*–*Muhlenbergia capillaris*–*Liatris pycnostachya* var. *lasiophylla* Woodland; *Sporobolus silveanus*–*Carex meadii* Herbaceous Vegetation; *Sporobolus silveanus*–*Tridens strictus* Herbaceous Vegetation (Weakley et al. 1998). Flowering July to November (or less typically at other seasons if stimulated by fire).

Comments.—There has been some confusion between this species and *S. heterolepis*. Allen (1992) and Thomas and Allen (1993) reported *S. silveanus* from Calcasieu Parish, Louisiana, and *S. heterolepis* from Allen Parish and/or Calcasieu Parish, but all specimens are actually *S. silveanus*. Similarly, both

S. silveanus and *S. heterolepis* have been historically reported from eastern Texas (Correll and Johnston 1970; Gould 1975; Johnston 1990; Hatch et al. 1990). Brown (1993) determined all material from Texas and Louisiana to be *S. silveanus*, and reported *S. silveanus* as a state record for Oklahoma, a conclusion followed by Taylor and Taylor (1994) and Jones et al. (1997). *Sporobolus silveanus* has a bluish color in the field, and closely resembles *Muhlenbergia expansa* (Poir.) Trin., with which it often grows.

Representative specimens. LOUISIANA. Allen Parish: longleaf pine woods, W of Kinder, 20 Oct 1940, *Brown et al.* 5717 (LSU). Calcasieu Parish: 5 mi S of Starks, 1949, *Swallen* 10511 (GH). OKLAHOMA. Bryan Co.: prairie near Durant, 21 Oct 1953, *Jesse s.n.* (OKLA). TEXAS. Angelina Co.: longleaf pine uplands of the proposed Graham Creek Wilderness, 8.8 mi S of Zavalla on US 69 and E on FR 314, 22 Sep 1979, *Nixon & Ward* 9659 (ASTC). Brazos Co.: along highway 6, 12 mi S of College Station, 8 Oct 1969, *Leonard* 250 (TAES); Galveston Co.: on 14th street one block W of Ave. I (FM 517), 19 Sep 1974, *Waller & Bauml* 3128 (SBSC, TAES, TEX). Hardin Co.: pine forest border, 6 mi SW of Kountze, 15 Oct 1964, *Gould* 11028 (BRIT/SMU, TAES, TEX, US). Harris Co.: Red Bluff Road, 1.5 mi W of SH 146, NW of Seabrook, 18 Sep 1974, *Waller & Bauml* 3128 (GH, TAES, TEX, US). Jasper Co.: SE of Zavalla on US 63, 1.6 mi SE of the Plum Ridge Road, 29 Aug 1978, *Marietta & Nixon* 486 (ASTC, TEX). Lamar Co.: "Tridens Prairie" 7 mi W of Paris at intersection of highway 82 and FR 32, *Collins s.n.*, Nov 1971 (LL, TAES, TEX). Newton Co.: 16 mi N of Newton, 11 Oct 1934, *Parks & Cory* 10832 (TAES). Orange Co.: open woods about 10 mi NE of Orange, 30 Sep 1940, *Silveus* 6441 (US). Rains Co.: in fine sandy clay between RR and highway, 3.5 mi NW of Point, 12 Sep 1948, *Shimmers* 10239 (BRIT/SMU). Tyler Co.: longleaf pine grassland, 6.5 mi E of Chester on route 1745 then left 3 mi to xeric Oligocene outcrop, 19 Oct 1967, *Correll* 35172 (LL). Van Zandt Co.: sands, Wills Point, 15 Oct 1903, *Reverchon* 3484 (US).

5. *Sporobolus teretifolius* R.M. Harper, Bull. Torrey Bot. Club 33:229. 1906. (Figs. 1, f; 2). TYPE: U.S.A. GEORGIA: Colquitt Co.: S of Moultrie, 20 Sep 1902, *Harper* 1642 (HOLOTYPE: NY; ISOTYPE: US-431954!).

Caespitose perennials. Culms (20-)35-80(-100) cm tall, erect, wiry, nodes all basal; base diameter 1-2 mm, flattened; internodes glabrous. Sheaths glabrous to appressed hairy, hairs up to 4 mm long; base shiny and enduring; margins hyaline; summit with a tuft of contorted hairs, hairs up to 4 mm long. Ligules 0.2-0.4 mm long, a line of hairs. Blades (10-)25-54 cm long, 0.5-1.2 mm wide, tightly involute or terete, green to yellowish-green, senescing or turning tan in late autumn, glabrous above and below; base often sparsely hairy, hairs up to 3 mm long. Panicles 10-26 cm long, 1-9 cm wide, mostly open to somewhat contracted when immature, narrowly pyramidal to ovate; main axis scabrous; pulvini in axils of primary branches often hairy; primary branches 1-8 cm long, ascending to spreading 0-40° from culm axis, not floriferous on lower 1/3; pedicels 3-18 mm long, longer than spikelet, usually spreading, with scattered ascending hairs. Spikelets 4-5.6 mm long, purplish-brown. Glumes 2-5.6 mm long, linear-lanceolate, membranous, 1-veined, unequal, ratio of lower/upper glume length (0.53-)0.55-0.70(-

0.77); lower 2–3.8 mm long, apex acuminate; upper 4–5.6 mm long, apex acuminate. Lemmas 3.4–4.4 mm long, ovate, membranous, 1-veined, glabrous; apex acute. Paleas 3.3–4.4 mm long, ovate, membranous, glabrous; apex acute. Stamens 3, anthers 1.5–2.6 mm long, purplish. Grains not seen.

Common name.—Wireleaf dropseed.

Distribution and habitat.—Southeastern North Carolina south to southern Georgia, west to extreme southeastern Alabama. Wet to moist pine woodlands, under *Pinus serotina*, *Pinus elliottii* var. *elliottii*, and *Pinus palustris*, in soils; 10–150 m. *Sporobolus teretifolius* characteristically occurs in the following National Vegetation Classification plant associations: *Pinus palustris*–*Pinus serotina*/*Magnolia virginiana*/*Sporobolus teretifolius*–*Carex striata* Woodland (Weakley et al. 1998) and others not yet described. Flowering July to November (or less typically at other seasons if stimulated by fire).

Comments.—The terete leaves (well figured by Harper 1906) are distinctive. Dry blades (either on dried specimens or in nature under dry field conditions) of the other eastern species with narrow blades (*S. curtissii*, *S. pinetorum*) can superficially resemble those of *S. teretifolius*, and have caused confusion. *Sporobolus curtissii*, however, has much shorter blades and generally occurs in drier habitats, and the blades of *S. pinetorum* have distinctly rough margins (best felt by running ones finger along the blade towards its base, or seen at 10° or greater magnification).

Representative specimens. **ALABAMA.** Houston Co.: James Hughes pitcher plant bog, 1.5–2.0 mi NE of Cottonwood, burned annually, 4 Aug 1996, *MacDonald* 9835 (IBE). **GEORGIA.** Berrien Co.: very broad powerline on N side of route 76, about 1.7 mi SW of Nashville, 27 Oct 1994, *Sorrie s.n.* (NCU). Bulloch Co.: sloping moist pine barrens, about 7 mi NW of Statesboro, 12 Sep 1954, *Harper* 4309 (GA). Candler Co.: about 3.25 mi W of Metter on Stillmore Road, ecotone on E side of a N-S swampy tributary of Sams Creek, S side of road, 22 Apr 1994, *Sorrie & Stouell s.n.* (NCU). Coffee Co.: rather dry pine-barrens near Douglas, upper Eocene overlaid by Lafayette and Columbia, 22 Sep 1900, *Harper* 677 (NY). Colquitt Co.: moist pine barrens near Moultrie, 20 Sep 1902, *Harper* 1642 (GA, NY, US). Cook Co.: low seepage area (pitcher plant bog) alongside GA 76, 2.7 mi NE of Barney, 21 Sep 1965, *Faircloth & O'Neal* 2994 (GA). Dodge Co.: reported without precise location by Harper (1906). Dooly Co.: reported without precise location by Harper (1906). Emanuel Co.: moist mown margin of GA 57 just NW of milepost 5, S side of road, at edge of shrubby ecotone of the W side of Flat Creek, NW of Swainsboro, 6 May 1994, *Sorrie s.n.* (NCU). Screven Co.: E side of US 301 at South Fork Ogeechee Creek (milepost 7), S of Sylvania, 25 Oct 1994, *Sorrie s.n.* (NCU). Thomas Co.: Greenwood Plantation, Thomasville, damp peaty soil bordering a *Magnolia virginiana*–*Nyssa biflora* drainage, area burned June 1985, 23 Oct 1985, *Gbolson, Godfrey, Komarek, & Baker* 11522 (GA). Tift Co.: Vicinity of Irby P.O. (Cycloneta Station), 28 Jul 1890, *Tracy s.n.* (NY) [note that present Tift Co. was part of Irwin Co. at the time of Tracy's collection]. Toombs Co.: among a colony of pitcher plants, 3 mi N of Lyons, 28 Jul 1961, *Banks s.n.* (GA). Turner Co.: seepage slope flanking route 32, W side of Little Sand Creek, 25 Aug 1994, *Sorrie s.n.* (NCU). Wheeler Co.: moist pine barrens, 2 mi W of Alamo, Plummer sandy loam, *Pullen & Plummer* 881 (GA). **NORTH CAROLINA.** Brunswick Co.: Camp Branch Savanna remnant, just N of SR 1335, ca. 1.2 mi E of its junction with SR 1334, back edge of savanna, near fire

ditch at ecotone to pocosiny swamp, 16 Jul 1991, *Weakley & Schafale s.n.* (US). **Columbus Co.:** Old Dock Savanna, south of SR 1928, ca. 0.9 mile W of Old Dock, then south on logging road ca. 0.3 mi, 15 Jul 1991, *Weakley & Schafale s.n.* (US). **SOUTH CAROLINA. Georgetown Co.:** pine savanna in Bates Hill Plantation, ca. 4.0 km SE of the US 701/SC 261 intersection, 5 Sep 1989, *Taggart s.n.* (USCH). **Horry Co.:** along powerline, situated between Mose Swamp and Grass Bay, take SC 109 ca. 2 mi NW of Baker Crossroads, then W and intersect with Santee Cooper Power right-of-way, 22 Sep 1992, *Pittman & Jordan s.n.* (USCH). **Kershaw Co.:** mesic slope, SC 28-102, 2.8 mi N of SC 12, 29 Sep 1958, *Duke 2979* (NCU).

RELATIONSHIPS WITHIN *SPOROBOLUS*

Stapf (1898), Bor (1960), Clayton et al. (1974), and Baaijens and Veldkamp (1991) have suggested infrageneric classifications in *Sporobolus* based primarily or strictly on Old World species, and a more worldwide classification is still lacking. Based on possession of an open or contracted panicle, caespitose perennial lifeform, non-whorled branch insertion, intravaginal new shoot initiation, and first glume shorter or as long as the second Pilger (1956) erected group four in subgenus *Sporobolus*. He further divided group four into two smaller groups α & β . *Sporobolus heterolepis*, *S. floridanus*, *S. teretifolius*, and *S. lasiophyllus* Pilg. are members of Pilger's "B" group. We agree with Pilger's assessment that *S. heterolepis*, *S. floridanus*, and *S. teretifolius* appear to be closely related. However, *S. lasiophyllus* has a few unique characteristics, such as its strictly basal leaves with sheath bases that are densely lanate and thickened, and its plumbeous to dark-brownish spikelets.

Small (1933) divided *Sporobolus* of the southeastern United States into seven groups, which are not considered validly published because their rank was not indicated. He placed *S. junceus* [as "*S. gracilis* (Trin.) Merr."], *S. floridanus*, *S. curtissii*, and *S. teretifolius* in "*Graciles*," distinguished by perennial, bunchgrass habit, large (more than 3 mm long), purplish to brown spikelets, and glumes unequal, the second as long as the floret. *Sporobolus heterolepis* was not known by Small to occur in his "flora area," so it is unknown whether he would have placed this with "*Graciles*" or not.

We informally recognize the *S. floridanus* complex, consisting of five species (*S. curtissii*, *S. floridanus*, *S. pinetorum*, *S. silveanus*, and *S. teretifolius*) with very similar morphological features and generally similar ecological requirements (primarily restricted to pine savannas on the Coastal Plain). All five species exhibit the following characteristics: caespitose perennials; basal sheaths shiny and enduring (apparently as "fire-proofing"); panicles open at maturity, with ascending panicle branches, pyramidal to ovate, primary branches not floriferous on lower 1/3; spikelets purplish-brown to purplish; lower glume linear-lanceolate to lanceolate, apex acuminate; grain fusiform to obovoid. Additionally, all five species occupy fire-maintained pinelands of the southeastern Coastal Plain, and produce culms only following removal of foliage by fire

(or rarely, by mechanical disturbance) [Weakley 1998].

The *S. floridanus* complex appears to have its closest affinities with two pairs of species: 1. *S. heterolepis* and *S. interruptus* Vasey, and 2. *S. junceus* and *S. purpurascens* (Swartz) Hamilton. *Sporobolus heterolepis* and *S. interruptus* appear to be sibling species, *S. heterolepis* being widely distributed in central North America, and extending as an uncommon disjunct into eastern North America, and *S. interruptus* being endemic in northern Arizona. They share several characters which distinguish them from the *S. floridanus* complex: spikelets plumbeous (vs. purplish fading to tan), grains globose (vs. elongate and laterally flattened), scaberulous lower glumes (vs. glabrous), and fibrous sheath bases (vs. shiny and indurated). *Sporobolus heterolepis* appears to be particularly closely related to *S. silveanus*, the most western of the *S. floridanus* complex, and the one most likely to have been geographically and ecologically in contact with *S. heterolepis* in recent times. Ecologically, *S. heterolepis* is a species of glades, prairies, and barrens, usually over mafic, ultramafic or calcareous rock outcrops in the interior, "hard rock" physiographic provinces of central North America (extending as a rare disjunct east to and occasionally beyond the Blue Ridge Mountains), as well as on loess and glacial tills.

Sporobolus junceus and *S. purpurascens* also appear to be siblings, *S. junceus* being a species primarily of the southeastern United States Coastal Plain (from southeastern Virginia west to eastern Texas), but extending inland to adjacent provinces, while *S. purpurascens* is distributed in southern Texas, Mexico, the West Indies, and into tropical America. They share several characters which distinguish them from the *S. floridanus* complex: panicle branches distinctly whorled in well-marked verticils (vs. panicle branches alternate or sometimes irregularly paired or approximate) and spikelets smaller (3.0–3.8 mm long vs. 3.5–7.2 mm long).

DISTRIBUTION AND ECOLOGY

Sporobolus curtissii, *S. floridanus*, *S. pinetorum*, *S. silveanus*, and *S. teretifolius* are all relatively narrow endemics of various portions of the southeastern Coastal Plain (Figs. 2, 3). Each of these five species is the locally dominant or codominant grass in fire-maintained pinelands with open canopies of *Pinus palustris*, *P. serotina*, and/or *P. elliotii* var. *elliotii* (Weakley et al. 1998). The geographic distributions and many ecological requirements of the four more eastern species overlap, but they can be separated based on a hydrologic gradient. Understanding the differing but overlapping distributions and ecological niches of the species within the group provides an important basis for the systematic treatment.

The five species of the complex share a set of apparent adaptations to the

fire-maintained habitats in which they occur. All have the basal sheaths thickened and cartilaginous, rightly investing the growing tips of the rhizomes, and protecting it from damage or destruction by fire. This is a conspicuous feature of herbarium specimens (if not removed by overzealous preparation), appearing as a stramineous, shining, thickened (almost bulbous) base of the plant. The bases of *Calamovilfa brevipilis* and *Calamovilfa curtissii* (Vasey) Scribn. are very similar. Species of the *S. floridanus* complex re-sprout quickly following fire, with green leaf material protruding beyond the blackened basal sheaths within days following fire. Like other southeastern bunchgrasses adapted to fire-maintained pinelands, including *Calamovilfa brevipilis*, *C. curtissii*, *Aristida stricta*, *A. beyrichiana*, and *Ctenium aromaticum*, all five *Sporobolus* species generally produce culms only after having their leaves removed by fire, although they will sometimes flower in response to mechanical disturbance. For this reason, nearly all herbarium specimens have the upper portions of the basal sheaths conspicuously blackened.

General exclusion of fire from much of the pineland habitat of the five species of the *S. floridanus* complex, combined with their flowering only in response to fire, means that the species are often overlooked or misidentified, and that they are severely under-represented in herbaria despite their local abundance. The four narrower-bladed species, *S. pinetorum*, *S. curtissii*, *S. teretifolius*, and *S. silveanus*, are often actively or passively misidentified as other sympatric pineland bunchgrasses, such as *Aristida stricta*, *A. beyrichiana*, or *Muhlenbergia expansa*. Entire savannas of a hundred hectares or more dominated by *S. pinetorum* have been assumed to be "longleaf pine/wiregrass," though in reality *Aristida stricta* may be completely absent. For this reason, it is important that field biologists become familiar with the vegetative characters which allow recognition of these taxa in sterile condition.

The complex reaches its greatest diversity in the Coastal Plain of Georgia, where *S. floridanus*, *S. curtissii*, *S. teretifolius*, and *S. pinetorum* are all found, and co-occur in various combinations of two and three species, along with the related *S. junceus*. *Sporobolus silveanus* is the only species of the complex that is fully allopatric, and the only one that occurs west of the Mississippi River. In southeastern North Carolina, *S. pinetorum* and *S. teretifolius* occur in wet pinelands dominated by mixtures of *Pinus palustris*, *Pinus serotina*, and *Taxodium ascendens*. They generally co-occur with other savanna bunchgrasses, notably *Ctenium aromaticum*, *Calamovilfa brevipilis*, *Muhlenbergia expansa*, and *Aristida stricta*. *Sporobolus teretifolius* is restricted to the wettest pine savannas, usually so wet as to exclude *Aristida stricta*, and it may be the sole dominant, or codominant with *S. pinetorum*, *Ctenium aromaticum*, and *Muhlenbergia expansa*. Slightly less wet savannas have varying mixtures of *S. pinetorum*, *Aristida stricta*, *Muhlenbergia expansa*, and *Ctenium aromaticum*. A similar

composition, though often with substantial *Calamovilfa brevipilis* as well, is seen in sandhill/pocosin ecotones in the inner Coastal Plain.

A general hydrologic gradient of the five species and the sympatric *S. junceus* would be (from wetter to drier) *S. floridanus*, *S. teretifolius*, *S. pinetorum*, *S. silveanus*, *S. curtissii*, *S. junceus*. *Sporobolus floridanus* is restricted to habitats which are saturated at least seasonally (and often semi-permanently) and may even have shallow ponds for weeks or even months. The other species are generally intolerant of ponds for more than a few days. *Sporobolus teretifolius* occurs in habitats with semi-permanent to seasonal saturation, whereas *S. pinetorum* occurs in habitats with seasonal saturation. *Sporobolus silveanus* and *S. curtissii* occur in a range of sites, from seasonally saturated to sites which are rarely saturated at the surface for periods of short duration only, and may range up to rather well-drained (though not xeric) sites. *Sporobolus junceus* strictly occupies well-drained sites, ranging into truly xeric, sandhill situations, where it reaches its greatest abundance.

Sporobolus floridanus generally occupies the wettest habitats of the complex. Particularly towards the edges of its distribution, it is generally found in very wet situations, often where water stands for periods of time, often in seepage bogs or swales, and generally associated with *Pinus elliotii* var. *elliotii* and *Taxodium ascendens*. Near the center of its distribution, especially in the eastern portion of the Florida panhandle, *S. floridanus* ranges into less wet habitats, and occurs in "mesic flatwoods." Where its distribution overlaps with *S. pinetorum*, *S. curtissii*, and *S. teretifolius*, it can occur (with clumps side by side), but it clearly ranges ecologically into wetter sites and avoids drier sites.

The four eastern species in the *S. floridanus* complex commonly co-occur in pineland landscapes, and sometimes occur in mixed populations, with individuals of various species intermixed. In these circumstances, the various species are always readily distinguishable by morphological characters. No intermediates or likely hybrids have been seen. None of these species has been investigated cytologically.

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